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RESEARCH ARTICLE

PRODUCTIVITY EVALUATION OF ORGANICALLY GROWN OCIMUM SANCTUM AND *OCIMUM GRATISSIMUM* LEAVES UNDER RAINFED CONDITION OF CENTRAL INDIA

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ABSTRACT

Two *Ocimum* species viz., *O. sanctum and O. gratissimum* were grown under contract organic farming from last five years in twenty nine villages with thirty four growers. In order to study the herbage yield, a technical survey was conducted by CSIR-CIMAP for productivity evaluation and economics of the leaves of *Ocimum spp.* under rainfed condition of central India. The survey revealed that majority of farmers are medium size growers (2-4 hectare) occupying 79 percent followed by small (1-2 hectare) and marginal (0-1 hectare.) with 16.4 and 3.28 percent respectively. Out of 29 survey sites, the maximum productivity (7.96 quintal/hectare), production value (43480 Rupees/hectare), net return (30332 Rupeess/hectare.) and cost benefit ratio (1:2.25) were observed in the site Hamirpur Ocimum -10 followed by Hamirpur Ocimum -17 and Hamirpur Ocimum -16 while the maximum cost of production (13786.73 Rs/ha.) was observed in Hamirpur Ocimum -23 and minimum in Hamirpur Ocimum -24.

INTRODUCTION

Ocimum, a medicinal plants belongs to the family Lamiaceae comprises of 50-150 species with its beneficiary production rate is quite famous among the people. *Ocimum* herbs and shrubs from the tropical region of Asia prominently confirms about its worldwide distribution (Akgul, 1983; Bartaux *et al*., 1992; Baily, 1924; Darrah, 1980). *Ocimum* signifies about medicinal value which includes stress relieving agent, energizing and also increasing the body efficient use of oxygen besides health benefit like reduces the stress, enhance the stamina and endurance. Three varieties of Tulsi Rama, Krishna and Vana are in majority of choice as herbal Tea, with its own distinct taste, delicious flavour and aroma. *Ocimum* spp. is grown in the semi arid region of central India in the District Hamirpur of Uttar Pradesh. Survey sites is situated in geographical status 25°-95' N to 80°-15' E and an average elevation of 80m.It lies between latitude 25° 7' N and 66° 7' N and longitude 79° 17' E and 80° 21' E, temperature varies between 3^0c to 46^0c and annual rainfall is 750 to 1000 mm. The soils are found Kabar (Black cotton soil) with pH ranges between 7 to 8.5 and rich in organic fertilizer. Major crops in these areas are Pulses, Gram, Wheat and Jowar. Most of the areas of Hamirpur district have un- irrigated and undulated land, in which only coarse cereal can be grown without fertilizer and other inputs, if there is inadequate rainfall in June and in September, production gets reduce. Hence, farmers look assured farming of organic Tulsi, Chikori, and Sataver. Farmers have adopted for cultural farming of Organic Tulsi due to its low cost of production, High productivity and maximum net return. A average productivity of organic Tulsi are ranged between 991.19 ton Rama Tulsi, 59 ton Krishna Tulsi and 104.44 ton Vana Tulsi respectively. Long term studies indicated that the excessive use of chemical fertilizers results in crop yield reduction. This reduction is due to the soil acidity, reduction of biological activity, a sharp decrease in soil physical properties and lack of micronutrients in NPK fertilizers (Adediran *et al*., 2004). In many cases, the application of chemical fertilizers causes environmental pollutions and ecological damages which itself decreases the production costs (Gosh and Bhat, 1998). To reduce these risks, a kind of resources and inputs must be used which can provide the current needs of plants and also can follow the agricultural system sustainability in long term (Murty and Ladha, 1988). The organic matters are considered as one of the important factors of soil fertility due to their beneficial effects on the physical, chemical, biological and productivity of soil (Schroder *et al*., 2005).

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MATERIALS AND METHODS

A technical survey was collected the primary and secondary data in the different organic Tulsi growers field in district Hamirpur during October, 2011. The data were generated and analysed on number of farmers involved, average land holding, cost of cultivation, average yield, production value, cost-benefit ratio, cropping pattern aspects through personal interview and field survey. Survey team also interacted with the company for total production and farmer-industry buy back guarantee. A questioner was circulated among the farmers to collect the information on yield, customer satisfaction, net income and constraints faced by them. Total of 334 farmers located in twenty nine sites of organic Tulsi growers were extensively interviewed in the month of February respectively.

RESULT AND DISCUSSION

Farmer's status according to land

Analysed data showed in Table-4 demonstrated that district Hamirpur comprises of 64.07 % farmers medium type covering 80.70 %, 25.44 % small, 10.17 % marginal and 0.29 % farmers are large type with percentage of 15.53, 3.25 and 0.50 area under organic Tulsi cultivation.

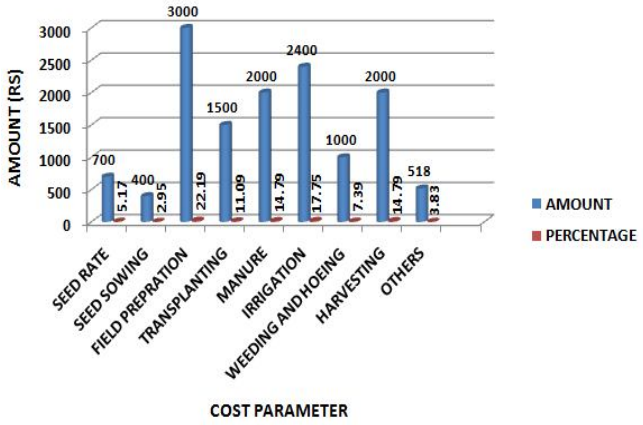

Fig 1. Average cost of cultivation of Ocimun sp. per ha

Table 1. Land use patterns of District Hamirpur, Uttar Pradesh

Total area in ha. (in sq km)	390178
Notified Forest land	6.2%
Non agri-used land	8.0%
Barren land	2.4%
Grazing land	0.0%
Under miscellaneous tree crops	0.2%
Cultivable Waste land	1.0%
Net sown	79.0%

Source: District-wise land use satellite Union Ministry of Agriculture, May 2008

Table 2. Average cost of cultivation per hectare

Parameters	Amount in Rupees
Seed rate	700.00
Seed sowing	400.00
Field preparation	3000.00
Transplanting	1500.00
Manure	2000.00
Irrigation	2400.00
Weeding & hoeing	1000.00
Harvesting	2000.00
Others	518.00
Total	13518.00

Table 3. Village wise Economic of Organic Tulsi in District Hamirpur 2011

S. No.	Sites Name	Productivity (q/hac.)	Cost of prod. per ha. (Rs)	Rs/q Leaf	production Vallue (Rs)	Net income (Rs)	Benefit cost ratio
		A	N	C	D=A*C	M=D-N	M/N
1	HOCI -1	7.38	13479.78	5500	40590	27110.22	2.01
2	HOCI -2	7.57	13519.2	5500	41635	28115.8	2.07
3	HOCI -3	7.58	13429.24	5500	41690	28260.76	2.1
4	HOCI -4	7.39	13421	5500	40645	27224	2.02
5	HOCI -5	7.53	13365	5500	41415	28050	2.09
6	HOCI -6	7.52	13466	5500	41360	27894	2.07
7	HOCI -7	7.58	13466	5500	41690	28224	2.1
8	HOCI -8	7.4	13488.4	5500	40700	27211.6	2.01
9	HOCI -9	6.83	13526	5500	37565	24039	2.01
10	HOCI-10	(7.96)	13448	5500	(43780)	(30332)	(2.25)
11	HOCI-11	7.12	13429	5500	39160	25731	1.91
12	HOCI-12	7.2	13421	5500	39600	26179	1.95
13	HOCI-13	7.33	13396	5500	40315	26919	2
14	HOCI-14	7.57	13476	5500	41635	28159	2.08
15	HOCI-15	7.41	13646	5500	40755	27109	1.98
16	HOCI-16	7.62	13471.8	5500	41910	28438.2	2.11
17	HOCI-17	7.62	13393	5500	41910	28517	2.12
18	HOCI-18	7.48	13435	5500	41140	27705	2.06
19	HOCI-19	7.58	13389	5500	41690	28301	2.11
20	HOCI-20	7.54	13477.96	5500	41470	27992.04	2.07
21	HOCI-21	7.59	13372.67	5500	41745	28372.33	2.12
22	HOCI-22	7.53	13358.67	5500	41415	28056.33	2.1
23	HOCI-23	7.6	(13786.73)	5500	41800	28013.27	2.03
24	HOCI-24	7.39	13340.49	5500	40645	27304.51	2.04
25	HOCI-25	7.4	13374.61	5500	40700	27325.39	2.04
26	HOCI-26	7.57	13411.37	5500	41635	28223.63	2.1
27	HOCI-27	7.51	13522.71	5500	41305	27782.29	2.05
28	HOCI-28	7.59	13434.28	5500	41745	28310.72	2.1
29	HOCI-29	7.4	13418.37	5500	40700	27281.63	2.03
Total		(216.79)	(390163.28)		(1192345)	(802181.72)	(2.05)

HOCI =Hamirpur Ocimum
HOCI-1=Bihuni, HOCI-2=Turna, HOCI-3=Umariya, HOCI-4=Bhaisal, HOCI-5=Rigwara, HOCI-6=Bhandawa, HOCI-7=Chhibouli, HOCI-8=Amoond, HOCI-9=Sankat Mochan, HOCI-10=Nadna, HOCI-11=Dhanauri, HOCI-12=Sarsai, HOCI-13=Kunata, HOCI-14=Byarjo, HOCI-15=Dadri, HOCI-16=Pahadiya, HOCI-17=Parapantar, HOCI-18=Itaura, HOCI-19=Mahua, HOCI-20=Kithaua, HOCI-21=Charuwa, HOCI-22=Richha, HOCI-23=Ghatera, HOCI-24=Gogaura, HOCI-25=Jarakhar, HOCI-26=Kargawa, HOCI-27=Atgaon, HOCI-28=REhuta, HOCI -29=Sena

Table 4. Farmers categories according to Growing areas and % of production

Types of Growers	Land Area (ha.)	No. of Farmers	Area (ha.)	Total Production (q)	% of farmer	% area of Growers	% of Production	Total Income In (Rs)	% Income of growers
Marginal Growers	<.1	34	26.26	201.8	10.17	3.25	3.32	740120	3.28
Small growers	1-2	85	125.27	989.53	25.44	15.53	16.32	3692988	16.4
Medium growers	2-4	214	650.87	4841.39	64.07	80.70	79.85	17961102	79.8
Large growers	>4	1	4.09	30.07	0.29	0.50	0.49	111855	0.49

Cost structure of Tulsi

Cost of cultivation data showed in Table-3 exhibited highest Cost of production in site Hamirpur Ocimum -23 in Rs 13786.73 followed by Hamirpur Ocimum -15 of Rs 13646. Land preparation major inputs cost covering 22.22% followed by 17.78 % in irrigation and 14.79% of harvesting.

Production and economics of organic Tulsi

Both the species of Ocimum are grown as organic Tulsi . The crop is economical and performs better in district Hamirpur. Out of twenty nine sites, Hamirpur Ocimum -6 exhibited maximum total production (504.08 q) while, maximum productivity (7.96q/ha.), net income (Rs.30332) and benefit cost ratio (2.25) were observed in site Hamirpur Ocimum -10 followed by Hamirpur Ocimum -17 and Hamirpur Ocimum I-16. Similarly, Prabhu *et al*. (2010) reported the highest dry herbage yield (1317 kg/ha) of sacred basil from the treatments of different combination of organic substances with highest benefit ratio of 2.71. Khalid *et al*. (2006) observed better growth and yield of *O. Basilicum* under different treatments of organic substances as compared to recommended chemical fertilizers.

Constraints faced by growers

Most of the organic farmers in the area facing the problem of non availability of good quality seed material followed by knowledge and skill about improved production technology of compost. Most of the agricultural practices are traditional and dependant on rain. Low soil fertility and its alkali nature leads to reduction in yield of the herb. Hence, production and profitability gets reduced and causing migration from the region. Post harvest processing is becoming costly due to non availability of sufficient labour and storage facility. Due to this growers use to adopt open drying method causing depletion of quality and quantity of leaves of *Ocimum* species.

Market linkages

Since the farmers of this region are dependent on rain and adopting single cropping. Therefore, an option of *Ocimum* contract farming with multinational companies leads to safeguard the livelihood in agriculture with assured returns. For the last five years, farmers are not getting sufficient returns due to non availability of improved variety and agro-technology of other crops. Hence, growers are still cultivating Tulsi as contract farming crop under rainfed condition. In these areas one of pioneer company Organic India provides the opportunity for the cultivation of organic Tulsi in terms of quality grading and its price categorising the product in three scale viz. Excellent (75 Rs/Kg), good (55 Rs/Kg) and medium (45 Rs/Kg), respectively.

Conclusion

Organic Tulsi is emerging as an economical crop and performs better in central India. Among the sites the maximum production, productivity, net return and cost benefit ratio was found in site Hamirpur Ocimum I-10 followed by Hamirpur Ocimum -17 and Hamirpur Ocimum -16 while maximum cost of production observed in site Hamirpur Ocimum -23. In these sites 64 % farmers are medium growers and it produce 79% of total production followed by small and marginal. Organic India plays a Major role in Bundelkhand region; it helps farmers through contract farming of Organic Tulsi and other medicinal plants. It provides all necessary material and economically supportive infrastructure to the farmers for organic Tulsi cultivation and purchase farmers produce at good price**.**

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